

THE CANADIAN BOTANICAL ASSOCIATION
BULLETIN
DE L'ASSOCIATION BOTANIQUE DU CANADA

February / février 2001

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Montréal



Patron / Président d'honneur
Her Excellency the Right Honourable / Son excellence la très honorable
Adrienne Clarkson, C.C., C.M.M., C.D.
Governor General of Canada / Gouverneure générale du Canada



On the inside / À l'intérieur

Page 2

Editors / La rédaction
CBA Section and Committee Chairs

**2001 CBA Annual Meeting /
Congrès annuel de l'ABC 2001**

Page 3

John Macoun Travel Bursary /
Bourse de voyage John Macoun

Page 4

Lionel Cinq-Mars Award /
Prix Lionel Cinq-Mars

Page 5

Iain and Sylvia Taylor Award /
Prix Iain and Sylvia Taylor
To be or not to be... a CBA Member /
Être ou ne pas être... membre de l'ABC

Page 6

Best Student Papers Awards

Page 7

Prix pour les meilleurs articles
écrits par les étudiants

Page 8

Poorly Known Economic Plants of Canada -
28. Cattail, *Typha* spp.

Page 15

Book Reviews

Page 16

CBA Board of Directors /
Bureau de direction de l'ABC
Future Meetings / Prochains congrès

**2001 CBA ANNUAL MEETING
KELOWNA, BC, 23-27 JUNE
CONGRÈS ANNUEL DE L'ABC 2001
KELOWNA, BC, 23-27 JUIN**

**SEE INSIDE
FOR MORE INFORMATION
VOIR À L'INTÉRIEUR
POUR PLUS D'INFORMATION**

**ABSTRACT SUBMISSIONS, REGISTRATION AND
COMPLETE INFORMATION AT :
INSCRIPTION, SOUMISSION DES RÉSUMÉS ET
INFORMATIONS COMPLÈTES À :**

<http://www.sci.ouc.bc.ca/biol/cba2001.html>

**DEADLINE FOR ABSTRACT
SUBMISSION AND EARLY REGISTRATION :
MARCH 31, 2001
DATE LIMITE POUR L'INSCRIPTION
ET L'ENVOI DES RÉSUMÉS :
31 MARS 2001**

Editors / La rédaction

Editor / rédacteur

Denis Lauzer

Assistant editor / rédacteur adjoint

Stuart Hay

Institut de recherche en biologie végétale
(Université de Montréal / Jardin botanique de Montréal)
4101, rue Sherbrooke Est
Montréal, Québec
H1X 2B2
Téléphone : (514) 872-8494
Télécopieur : (514) 872-9406
Courrier électronique : denis.lauzer@umontreal.ca

Information for submitting texts / Soumission des textes

Texts and illustrations for the Bulletin must be sent to the Editor preferably via the electronic mail (attached file) or on a diskette. Texts should be saved under "Word" and illustrations under the "TIFF" format.

If you have any question about text submission please contact the Editor.

Les textes et les illustrations pour le bulletin doivent de préférence être envoyés par courrier électronique (sous forme de fichier attaché) ou encore sur une disquette.

Les textes doivent être enregistrés sous « Word » et les illustrations sous le format « TIFF ».

N'hésitez pas à contacter le rédacteur pour toute information sur l'envoi de documents.

CBA Bulletin / Bulletin de l'ABC

The CBA Bulletin is issued quarterly (February, May, August, November) and sent to all CBA members.

Le Bulletin de l'ABC paraît quatre fois par année (février, mai, août, novembre) et est envoyé à tous les membres de l'ABC.

To ensure continuous delivery of the Bulletin please notify the Treasurer promptly of any change of address.

Veuillez communiquer tout changement d'adresse au trésorier afin de recevoir tous les numéros du bulletin.

If you have any comments or suggestions about the Bulletin, please contact the Editor at the above address.

Si vous avez des commentaires ou suggestions concernant le bulletin, veuillez s'il vous plaît contacter le rédacteur à l'adresse mentionnée plus haut.

Texts for the May issue must be received before April 15, 2001. Les textes pour le bulletin de mai doivent arriver au plus tard le 15 avril 2001.

CBA Section and Committee Chairs

Section Chairs (2000-2002)

Ecology

Dianne Fahselt

Department of Plant Sciences
University of Western Ontario
London, ON, N6A 5B7
dfahselt@julian.uwo.ca

Tel. : (519) 679-2111 ext. 6480; fax : (519) 661-3935

Mycology

James Traquair

Agriculture & Agri-Food Canada, Research Centre
1391 Sanford St
London, ON, N5V 4T3
traquairj@em.agr.ca

Tel. : (519) 457-1470, ext. 224; fax : (519) 457-3997

Structure & Development

Denis Barabé

IRBV-Jardin botanique de Montréal
4101, rue Sherbrooke Est
Montréal, QC, H1X 2B2
denis.barabe@umontreal.ca

Tel. : (514) 872-1436; fax : (514) 872-3765

Systematics & Phytogeography

Luc Brouillet

IRBV-Université de Montréal
4101, rue Sherbrooke Est
Montréal, QC, H1X 2B2
luc.brouillet@umontreal.ca

Tel. : (514) 872-8490; fax : (514) 872-9406

Teaching

Sylvie Laliberté

Dép. des sciences biologiques
Université du Québec à Montréal
C.P. 8888, Succ. Centre-ville
Montréal, QC, H3C 3P8
laliberte.sylvie@uqam.ca

Tel. : (514) 987-3963; fax : (514) 987-4647

Committee Chairs (2000-2002)

Conservation

Pam Krannitz

Pacific Wildlife Research Centre
5421 Robertson Road, R.R. 1
Delta, BC, V4K 3N2
pamk@interchange.ubc.ca

Tel. : (604) 946-4676; fax : (604) 946-7022

Science Policy

Denis Barabé

IRBV-Jardin botanique de Montréal
4101, rue Sherbrooke Est
Montréal, QC, H1X 2B2
denis.barabe@umontreal.ca

Tel. : (514) 872-1436; fax : (514) 872-3765

Development

Vipen Sawhney

Department of Biology
University of Saskatchewan
Saskatoon, SK, S7N 5E2
sawhney@admin.usask.ca

Tel. : (306) 966-4477; fax : (306) 966-4461

Membership

Hugues Massicotte

Forestry Program
Faculty of Natural Resources and Environmental Studies
University of Northern British Columbia
Prince George, BC, V2N 4Z9
lhugues@unbc.ca

Tel. : (250) 960-5813; fax : (250) 960-5538

**JOHN MACOUN TRAVEL BURSARY
FOR STUDENTS TO ATTEND
THE 2001 CBA ANNUAL
MEETING IN KELOWNA**

The John Macoun Travel Bursary, named in honour of the man who served as official botanist on five major expeditions throughout Canada during the late 19th and early 20th centuries, is awarded to a graduate student who presents an oral paper in the Lionel Cinq-Mars Competition.

Eligibility

1. The competition for this bursary is open to student members of CBA.
2. Students must present an oral paper in the Cinq-Mars Competition or a poster in the Taylor Competition at the 2001 CBA Annual Meeting in Kelowna.
3. No student may receive more than one travel bursary while registered for the same degree.

Procedures

1. Students applying for an award must do so no later than March 31, 2001.
2. The application must contain the following documents :
 - a) a copy of the abstract of the paper to be given in the Cinq-Mars or Taylor Competitions at the 2001 CBA Annual Meeting in Kelowna;
 - b) a supporting letter from the student's Supervisor of research that also includes a statement that the student is engaged in a M.Sc. or Ph.D. program;
 - c) the student's curriculum vitae (one page);
 - d) a letter of recommendation from a member of the student's research committee (not the Supervisor).
3. Send the complete set of application documents to :

Joe Gerrath

70 Dumbarton St.

Guelph ON

N1E 3T6

Tel. : (519) 822-1964

E-mail : jfgerrath@uoguelph.ca

4. The CBA President will appoint a committee to screen all applications and to recommend the candidates for the bursaries. The sole selection criteria shall be those of academic merit.
5. Bursary winners will possibly be notified before the end of April 2001, and the award will be sent at that time.

**BOURSE DE VOYAGE JOHN MACOUN
POUR LES ÉTUDIANTS QUI
PARTICIPENT AU CONGRÈS ANNUEL
DE L'ABC 2001 À KELOWNA**

La bourse de voyage John Macoun est décernée en l'honneur de John Macoun, qui dans l'exercice de ses fonctions en tant que botaniste a participé à cinq expéditions majeures à travers le Canada de la fin du 19e siècle au début du 20e siècle, à un étudiant qui présente une communication orale dans le cadre de la compétition Lionel Cinq-Mars.

Admissibilité

1. La compétition pour cette bourse est ouverte aux étudiants membres de l'ABC.
2. L'étudiant doit présenter une communication orale dans la compétition Cinq-Mars ou un poster dans la compétition Taylor au congrès annuel de l'ABC 2001 à Kelowna.
3. Un étudiant ne peut pas recevoir plus d'une bourse de voyage pour la période durant laquelle il est inscrit à un programme spécifique.

Marche à suivre

1. Les étudiants doivent faire parvenir leur demande pour la bourse de voyage au plus tard le 31 mars 2001.
2. La demande doit contenir les documents suivants :
 - a) une copie du résumé de la communication présentée dans la compétition Cinq-Mars ou dans la compétition Taylor du congrès annuel de l'ABC 2001 à Kelowna;
 - b) une lettre de recommandation de la part du directeur de thèse de l'étudiant et une preuve que l'étudiant en question est inscrit à un programme de maîtrise ou de doctorat;
 - c) le curriculum vitae de l'étudiant (une page seulement);
 - d) une lettre de référence d'un membre du comité de direction de l'étudiant (directeur de mémoire ou de thèse exclu).
3. Veuillez faire parvenir la demande complète à :

Joe Gerrath

70 Dumbarton St.

Guelph ON

N1E 3T6

Tél. : (519) 822-1964

Courriel : jfgerrath@uoguelph.ca

4. Le président de l'ABC mettra sur pied un comité de sélection qui examinera les demandes et recommandera les candidats pour les bourses. Le seul critère d'évaluation sera celui du mérite académique.
5. Les gagnants des bourses seront avisés avant la fin du mois d'avril 2001. Les prix leur seront remis à ce moment-là.

**LIONEL-CINQ-MARS AWARD
FOR THE BEST STUDENT ORAL
PAPER PRESENTED AT THE
THE 2001 CBA ANNUAL
MEETING IN KELOWNA**

Each year the Canadian Botanical Association gives an award for the best student oral paper presented at the CBA Annual Meeting. The award is made in memory of Lionel Cinq-Mars, a founding member of the Association and a widely admired teacher.

Any bona fide student enrolled at a Canadian institution of higher learning is eligible, as well as Canadian students at foreign institutions, both undergraduate or graduate. Every effort will be made to ensure that each student in the competition has a fair evaluation and an equal chance of winning the award.

Oral presentations will be evaluated by a panel of judges (at least one from each of the sections of CBA) which is chaired by the President-Elect, Liette Vasseur. The merit of each poster will be judged on the basis of content (60 %) and presentation (40 %). All students who wish to compete for this award must check off the appropriate box on the abstract submission form [see the congress website (address on front page)].
Deadline: March 31, 2001.

Melanie Jones
Okanagan University College
3333 College Way
Kelowna BC
V1V 1V7
Tel. : (250) 862-5464 ext. 7553
fax : (250) 470-6005
e-mail : mjones@okanagan.bc.ca

**PRIX LIONEL-CINQ-MARS
POUR LA MEILLEURE
COMMUNICATION ORALE
PRÉSENTÉE PAR UN ÉTUDIANT
AU CONGRÈS ANNUEL DE
L'ABC 2001 À KELOWNA**

Chaque année l'Association botanique du Canada décerne un prix pour la meilleure communication orale présentée par un étudiant lors du congrès annuel de l'ABC. La récompense est remise à la mémoire de Lionel Cinq-Mars, un des membres fondateurs de l'Association et un professeur fort admiré.

Tout étudiant inscrit à une institution canadienne d'études supérieures ou tout étudiant canadien inscrit à une université étrangère, qu'il soit de 1er, 2e ou 3e cycle, est éligible à ce prix. Tout sera mis en oeuvre afin d'assurer que chaque étudiant soit évalué justement et qu'il ait une chance égale de remporter ce prix.

La décision finale sera rendue par un jury comprenant au moins un membre de chaque section de l'ABC. Le jury sera dirigé par le président désigné, Liette Vasseur. La qualité du poster sera jugée en fonction du contenu (60%) et de la présentation (40%). Les étudiants qui désirent participer à la compétition Lionel Cinq-Mars doivent cocher la case appropriée sur le formulaire de soumission des résumés [voir le site Internet du congrès (adresse en page couverture)]. Date limite : 31 mars 2001.

Melanie Jones
Okanagan University College
3333 College Way
Kelowna BC
V1V 1V7
Tél. : (250) 862-5464 ext. 7553
fax : (250) 470-6005
Courriel : mjones@okanagan.bc.ca

CBA Website / Site Internet de l'ABC

www.uoguelph.ca/botany/cba/
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CBA Life Member

At the 2000 Annual General Meeting of the Canadian Botanical Association there was a motion passed to allow anyone over 55 years of age to become a 'Life Member' for only \$500.00.

This information was not provided on the membership renewal notices that were sent out to the membership in November. If anyone has paid a \$45.00 regular membership fee but would like to upgrade that to a '55 Life Member' please send a cheque for the difference (\$455.00) with an explanation to:

CBA, Box 160
Aberdeen SK
S0K 0A0

**IAIN AND SYLVIA TAYLOR AWARD
FOR THE BEST STUDENT POSTER
PRESENTED AT THE
THE 2001 CBA ANNUAL
MEETING IN KELOWNA**

The Canadian Botanical Association gives each year an award for the best student poster presented at the CBA Annual Meeting. The award is made in honour of Iain and Sylvia Taylor two members who have for many years actively contributed to the development of the CBA.

Any bona fide student enrolled at a Canadian institution of higher learning is eligible, as well as Canadian students at foreign institutions, both undergraduate or graduate. Every effort will be made to ensure that each student in the competition has a fair evaluation and an equal chance of winning the award.

Presentations will be evaluated by a panel of judges which is chaired by the Vice-President, Melanie Jones. Students who wish to compete for this award must check off the appropriate box on the abstract submission form [see the congress website (address on front page)] and send a copy of the abstract to : (deadline: March 31, 2001)

Melanie Jones

Okanagan University College
3333 College Way
Kelowna, BC, V1V 1V7

Tel. : (250) 862-5464 ext. 7553; fax : (250) 470-6005
e-mail : mjones@okanagan.bc.ca

**PRIX IAIN AND SYLVIA TAYLOR
POUR LE MEILLEUR POSTER
PRÉSENTÉ PAR UN ÉTUDIANT
AU CONGRÈS ANNUEL DE
L'ABC 2000 À KELOWNA**

Chaque année l'Association botanique du Canada décerne un prix pour le meilleur poster présenté par un étudiant lors du congrès annuel de l'ABC. La récompense est remise en l'honneur de Iain et Sylvia Taylor, deux membres actifs qui contribuent depuis longtemps au développement de l'ABC.

Tout étudiant inscrit à une institution canadienne d'études supérieures ou tout étudiant canadien inscrit à une université étrangère, qu'il soit de 1er, 2e ou 3e cycle, est éligible à ce prix. Tout sera mis en oeuvre afin d'assurer que chaque étudiant soit évalué justement et qu'il ait une chance égale de remporter ce prix.

La décision finale sera rendue par un jury dirigé par la vice-présidente Melanie Jones. Les étudiants qui désirent participer à la compétition Iain and Sylvia Taylor doivent cocher la case appropriée sur le formulaire de soumission des résumés [voir site Internet du congrès (adresse en page couverture)] et envoyer une copie du résumé à : (date limite : 31 mars 2001)

Melanie Jones

Okanagan University College
3333 College Way
Kelowna, BC, V1V 1V7

Tél. : (250) 862-5464 ext. 7553; fax : (250) 470-6005
Courriel : mjones@okanagan.bc.ca

To be or not to be... a CBA member

Yes, it is that time of the year when you should be renewing your affiliation with the Canadian Botanical Association. The CBA continues to be an important venue for following botanical issues both in Canada and abroad and for sharing information with colleagues from all areas of the plant sciences, all this culminating in the Annual CBA meeting, this year in Kelowna. Membership is imperative to maintain a vibrant and diverse organization! If you have not renewed yet, please send your cheque to:

Mikisiw Computing Ltd.
CBA Membership
103 Kenossee Court
Saskatoon, SK, S7J 3S7

Please also consider asking a colleague to join the CBA ranks or sign up a student or a post-doctoral fellow (only \$ 25.00!). If you have lost your Membership Form or need some more, please contact me.

Hugues Massicotte, hugues@unbc.ca,
CBA Membership Committee

Être ou ne pas être... membre de l'ABC

Oui, c'est la période de l'année où l'on doit renouveler notre adhésion à l'Association botanique du Canada. L'ABC est un outil qui permet de suivre les débats de l'heure en botanique, au Canada et ailleurs, de partager de l'information avec nos collègues impliqués dans toutes les sphères d'activité de la biologie végétale, et finalement de se rencontrer une fois l'an durant le congrès annuel, cette année à Kelowna. Chacun des membres constitue une cellule essentielle pour maintenir le tissu vital de l'organisation. Si vous n'avez pas encore renouvelé votre adhésion, veuillez retourner votre chèque à :

Mikisiw Computing Ltd.
ABC Adhésion
103 Kenossee Court
Saskatoon, SK, S7J 3S7

De plus, demandez à un collègue s'il est intéressé à rejoindre l'ABC ou encore parrainez un étudiant ou un chercheur post-doctoral (c'est seulement 25,00 \$!). Si vous avez égaré votre formulaire d'adhésion ou si vous en désirez d'autres, veuillez s.-v.-p. me contacter.

Hugues Massicotte, hugues@unbc.ca
CBA Membership Committee

Best Student Papers Awards (Rowe, Steeves, Weresub and Porsild)

J.S. ROWE ECOLOGY AWARD

for the best student paper in plant ecology

This annual award was established to honour the contributions of Professor J. Stan Rowe who was the first chairman of the Ecological Section of the CBA. Professor Rowe contributed much to the advancement of ecology in Canada through his initiatives to encourage Canadian plant ecologists to join the CBA and to foster communication with their colleagues from around the world. He is well known for his seminal research on the relationship between land form and forest communities and as an enthusiastic and dedicated teacher.

Applications should be sent, before May 15, 2001, to:

Dianne Fahselt
Department of Plant Sciences
University of Western Ontario
London, ON, N6A 5B7
Tel. : (519) 679-2111 ext. 6480; fax : (519) 661-3935
E-mail: dfahselt@julian.uwo.ca

TAYLOR A. STEEVES AWARD

for the best student paper in plant structure and development

This annual award was established to honour the many-faceted contributions of Professor Taylor A. Steeves to the advancement of Botany in Canada. Professor Steeves has made significant contributions to our current understanding of plant morphology and development through research papers and textbooks. He was the editor of both the Canadian Journal of Botany and the Botanical Gazette. As a teacher and researcher, he displays an enthusiasm for plants and an ability to make even the most complex concepts seem understandable. The award is intended to symbolize these attributes so aptly displayed by Professor Steeves.

Applications should be sent, before May 15, 2001, to:

Denis Barabé
IRBV-Jardin botanique de Montréal
4101 rue Sherbrooke Est
Montréal, QC, H1X 2B2
Tel. : (514) 872-1436; fax : (514) 872-3765
E-mail: denis.barabe@umontreal.ca

L. K. WERESUB AWARD

for the best student paper in mycology

The income for this annual award comes from the Luella K. Weresub Memorial Fund in recognition of the original gift from Miss Matilda Weresub in memory of her sister.

Applications should be sent, before May 15, 2001, to:

Randolph S. Currah
Department of Biological Sciences
CW 405, Biological Sciences Centre, University of Alberta,
Edmonton, AB, T6G 2E9
Tél. : (403) 492-3484; Fax : (403) 492-9457
E-mail: r.currah@ualberta.ca

A. E. PORSILD AWARD

for the best student paper in systematics and phytogeography

The Porsild award is dedicated to the memory of Dr. Alf Erling Porsild for his many scientific contributions, especially his pioneering works in the Canadian North. Dr Porsild collected well over 100 000 plant specimens and published many papers, including major publications on the floras of Alaska, the Arctic Islands, the Northwest Territories, the Rocky Mountains, and the Yukon Territory.

Applications should be sent, before May 15, 2001, to:

Luc Brouillet
Institut de recherche en biologie végétale
Université de Montréal
4101, rue Sherbrooke Est
Montréal, QC, H1X 2B2
Tel. : (514) 872-8490; Fax : (514) 872-9406
E-mail : luc.brouillet@umontreal.ca

TERMS OF REFERENCE FOR THE AWARDS

1. All students who have graduated from or are currently enrolled in a Canadian university, or Canadian students who have studied abroad are eligible.
2. These awards are for work published while the author is still a student or based on work done while a student and published within two years of graduating. This make allowance for students who do not write until after thesis (graduate or undergraduate) completion and journal publication delays.
3. Students do not have to be CBA members to be eligible for the Rowe, Steeves, Weresub and Porsild awards.
4. No candidate may submit a paper for more than one award.
5. The student must be the sole or first author of the paper.
6. The paper must have been published during 2000. Papers published in late 1999 but not available in reprint form in time for the 2000 deadline (May 15, 2000) will be considered eligible.
7. Joint papers must be accompanied by a statement on university letterhead, signed by all the authors, estimating the percentage responsibility of each author for :
 - a) the ideas that led to the initiation of the project;
 - b) the actual research skill demonstrated;
 - c) the writing of the manuscript.
8. All applications should include four copies of each of the following:
 - a) a reprint of the paper (or a proof copy of the paper plus a letter from the editor of the journal stating that this paper is in press with a 2000 publication date);
 - b) the candidate's curriculum vitae, including current address and e-mail information;
 - c) a statement indicating that this student is currently enrolled in a degree program, or has completed such a program during the calendar year for which the award is to be made (except for extenuating circumstances with respect to timing of publication as noted above in (2));
 - d) a statement from the supervisor, the student, and any co-author, establishing responsibility for the paper as outlined above in (6).
9. Student award winners receive a one (1) year's membership in the CBA.
10. Applications and supporting document must be sent, before May 15, 2001, to the section chair responsible for the prize.

Prix pour les meilleurs articles écrits par les étudiants (Rowe, Steeves, Porsild et Weresub)

LE PRIX J.S. ROWE

pour le meilleur article en écologie

Ce prix annuel a été établi en l'honneur du professeur J. Stan Rowe qui fut le premier président de la section écologie de l'ABC. Le professeur Rowe a contribué au développement de l'écologie au Canada en encourageant les écologistes canadiens à joindre les rangs de l'ABC et à échanger avec leurs collègues du reste du monde. Le professeur Rowe est reconnu pour ses recherches sur les communautés forestières et son enseignement dynamique et enthousiaste.

Les candidatures doivent être envoyées avant le 15 mai 2001

à :
Dianne Fahselt
Department of Plant Sciences
University of Western Ontario
London, ON, N6A 5B7

Tél. : (519) 679-2111 ext. 6480; fax : (519) 661-3935

Courriel : dfahselt@julian.uwo.ca

LE PRIX TAYLOR A. STEEVES

pour le meilleur article en

structure et développement des plantes

Ce prix annuel a été établi pour honorer les divers types de contributions du professeur Taylor A. Steeves à l'avancement de la botanique au Canada. Le Dr. Steeves a apporté une importante contribution à notre connaissance de la morphologie et du développement des végétaux par la publications de livres et d'articles scientifiques originaux. Il a été directeur scientifique des revues scientifiques Canadian Journal of Botany et Botanical Gazette. Comme professeur, il manifeste une habileté exceptionnelle pour rendre intelligible des concepts scientifiques souvent complexes. Ce prix a pour objectif de mettre en valeur les qualités qui font la renommée du Dr. Taylor A. Steeves.

Les candidatures doivent être envoyées avant le 15 mai 2001

à :
Denis Barabé
IRBV-Jardin botanique de Montréal
4101 rue Sherbrooke Est
Montréal, QC, H1X 2B2
Tél. : (514) 872-1436; fax : (514) 872-3765
Courriel : denis.barabe@umontreal.ca

LE PRIX A.E. PORSILD

pour le meilleur article en systématique et en phytogéographie

Ce prix est décerné en l'honneur du Dr. Alf Erling Porsild pour ses nombreuses contributions scientifiques, particulièrement ses travaux portant sur le Nord canadien. Le Dr. Porsild a récolter plus de 100 000 spécimens de plantes et à publier un grand nombre d'articles, incluant des publications importantes sur la flore de l'Alaska, des Îles Artiques, des Territoires du Nord Ouest, des Montagnes Rocheuses et du Territoire du Yukon.

Les candidatures doivent être envoyées avant le 15 mai 2001

à :
Luc Brouillet
Institut de recherche en biologie végétale
Université de Montréal
4101, rue Sherbrooke est
Montréal, QC, H1X 2B2
Tél. : (514) 872-8490; Téléc. : (514) 872-9406
Courriel : luc.brouillet@umontreal.ca

PRIX L.K. WERESUB

pour le meilleur article en mycologie

Les sources de revenu pour ce prix annuel proviennent du Luella K. Weresub Memorial Fund. Ce fonds provient d'un don fait par madame Matilda Weresub en l'honneur de sa soeur.

Les candidatures doivent être envoyées avant le 15 mai 2001 à :

Randolph S. Currah
Department of Biological Sciences
CW 405, Biological Sciences Centre, University of Alberta,
Edmonton, AB, T6G 2E9
Tél. : (403) 492-3484; Fax : (403) 492-9457
E-mail: r.currah@ualberta.ca

RÈGLEMENTS POUR LES PRIX

1. Les étudiants qui viennent de terminer leurs études ou qui sont actuellement inscrits dans une université canadienne, de même que les étudiants canadiens qui étudient à l'étranger sont admissibles à ce prix.
2. Ces prix sont décernés pour des travaux publiés pendant que l'étudiant est encore aux études ou pour des travaux réalisés en tant qu'étudiant et publiés durant les deux ans suivant la promotion. Ceci permet de tenir compte des étudiants qui rédigent des publications après avoir obtenu leur diplôme et des délais de publication.
3. Les étudiants n'ont pas à être membre de l'ABC pour être admissibles aux prix Rowe, Steeves, Porsild et Weresub.
4. Les candidats ne peuvent soumettre un article à plus d'un prix.
5. L'étudiant doit être le seul ou le premier auteur de l'article.
6. L'article doit avoir été publié durant l'année 2000. Les articles qui ont été publiés à la fin de 1999 mais qui n'étaient pas disponibles sous forme de tirés à part pour le concours de 2000 (15 mai 2000) sont admissibles.
7. Les articles écrits en collaboration doivent être accompagnés d'une lettre avec l'en-tête de l'Université, signée par tous les auteurs, indiquant la participation de chacun aux aspects suivants :
 - a) les idées qui ont amené la mise sur pied du projet;
 - b) la réalisation de la recherche;
 - c) la rédaction du manuscrit.
8. Les dossiers doivent contenir quatre copies des documents suivants:
 - a) un tiré à part de l'article (ou une copie des épreuves avec une lettre de l'éditeur de la revue indiquant que l'article aura l'année 2000 comme date de publication);
 - b) le curriculum vitae du candidat, incluant son adresse postale et électronique;
 - c) une preuve démontrant que l'étudiant est inscrit dans un programme d'études ou qu'il vient de compléter un tel programme durant l'année pour lequel le prix est offert (ce règlement ne s'applique pas pour ceux qui répondent aux critères d'extension du délai tel qu'indiqué plus haut(2));
 - d) une lettre du directeur de recherche signée par tous les auteurs de l'article indiquant leur contribution respective dans la réalisation de la publication, tel que décrit précédemment (6).
9. Les lauréats recevront une adhésion d'un an à l'ABC.
10. Les candidatures et tous les documents requis doivent être envoyés avant le 15 mai 2001 au président de la section dans laquelle est attribuée le prix.

Poorly Known Economic Plants of Canada - 28. Cattail, *Typha* spp.

E. Small and P.M. Catling, Eastern Cereal and Oilseed Research Centre, Research Branch, Agriculture and Agri-Food Canada, Saunders Bldg., Central Experimental Farm, Ottawa ON K1A 0C6

Many of Canada's native species are like gold deposits awaiting discovery and development. Of the more than 3,000 native species in this country, which has the greatest unexploited value? The common cattail is a sleeping economic giant with truly astounding potential for food, fuel, and industrial commodities.

Latin Names

The Canadian taxa are *Typha latifolia* L., *T. angustifolia* L., and *T. xglauca* Godr. (*T. angustifolia* x *T. latifolia*). The name *Typha* has been said to trace to ancient Greek, but there are several possibilities regarding usage. It may have been a name for this genus or perhaps for other aquatics. Alternatively, *Typha* has been interpreted as originating from *typhos*, marsh or bog, or from *typhein*, to smoke or emit smoke, in allusion to the use of the spike for maintaining smoky fires, or to the smoky brown colour of the fruiting spikes.

English Names

Typha: Cattail (less commonly cat-tail, cat tail, cat's tail, cat-'o-nine-tail; the "cat tail" is the furry elongated female part of the inflorescence in seed); the following names are used in Europe, whereas cattail is almost universally used in North America: cattail-flag (cattail flag), soft flag, flag tule, flag, reed-mace (reed mace, reedmace), nail-rod (nailrod), water torch, candlewick, bulrush (bullrush; likely to cause confusion with

Scirpus species), clubrush

T. latifolia: common cattail, broad-leaved cattail (broadleaf cattail), great cattail, Cossack asparagus (the young shoots were popularly eaten like asparagus by the Cossacks of the Don Valley in Russia), great reedmace

T. angustifolia: narrow-leaved cattail (narrowleaf cattail), small cattail, lesser cattail, small bulrush, lesser bulrush, lesser reedmace, narrow-leaved reedmace

T. xglauca: hybrid cattail (the only Canadian hybrid, although other species of *Typha* hybridize), blue cattail, glaucous cattail, blue flag (a name usually applied to *Iris versicolor* L.)

French Names

Typha: quenouille, massette, typha, canne, roseau (roseau des étangs, roseau des marais & roseau de la passion applied both to *T. latifolia* & *T. angustifolia*)

T. latifolia: quenouille à feuilles larges, massette à larges feuilles, massette à feuilles larges, grande massette, canne de jonc, matelas, typha à feuilles larges, herbe au bedeau, masse d'eau

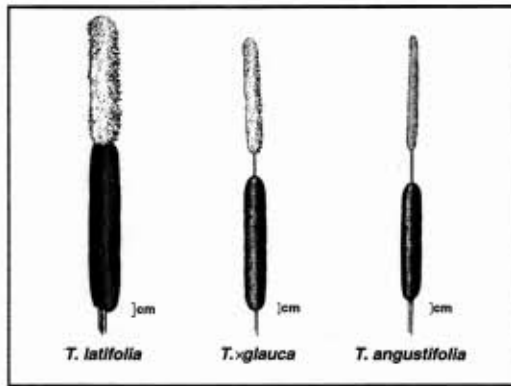
T. angustifolia: quenouille à feuilles étroites, massette à feuilles étroites, petite massette, typha à feuilles étroites

T. xglauca: quenouille glauque, massette hybride

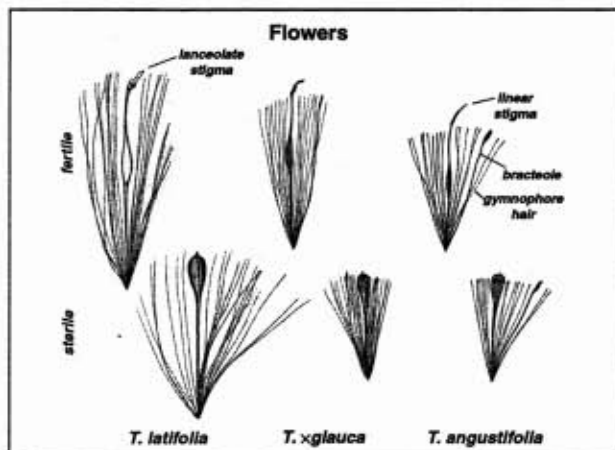
Morphology

Typha species are colony-forming, tall, stout, erect herbs with perennial fleshy rhizomes. The long linear leaves are flattish, alternate in two ranks, each leaf sheathed for much of its length by overlapping sheaths of lower leaves. The leaves are spongy, and in cross section show longitudinal air channels (aerenchyma). In the spring and early summer, single flowering spikes are produced. The flowers are minute, unisexual, and lack petals and sepals. The flowering spike is divided into two portions. The upper contains male flowers, each consisting of 2 to 5 stamens, and these drop away as soon as the pollen is shed, leaving the top of the spike naked at maturity. The plants are wind-pollinated, bearing copious pollen. Pollen in *T. latifolia* is shed as



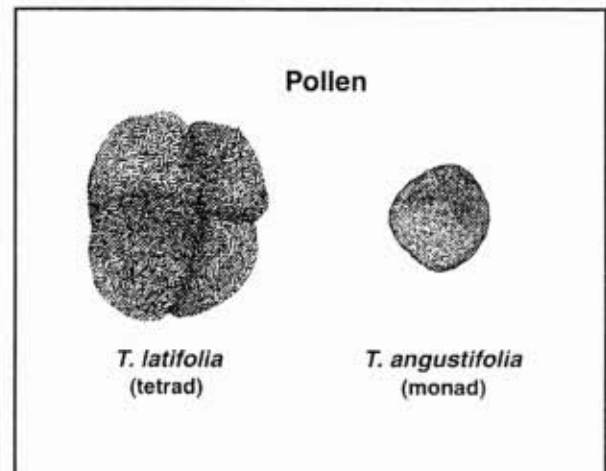


tetrads, while in *T. angustifolia* the pollen grains are distributed singly (monads), and because of the smaller weight the latter's pollen has a wider dispersal. The lower section of the flowering spike bears densely packed female flowers, each consisting of a simple pistil on a short stipe called the gynophore. Forty to 60 long, slender gynophore hairs arise at the base of the gynophore and surpass the ovary. A bracteole (floral bract) is present in female flowers of *T. angustifolia* and *T. xglauca*. This is about as long as the gynophore hairs, filiform, with a more or less broadened, brown tip. After fertilization, the female portion of the spike becomes fat and cigar-shaped, brown when mature, and whitish when old and the stigmas wear off. The female flowers become receptive before the pollen is shed, but some selfing can occur. The mature seed-bearing spike is thick, brown and fuzzy due to the crowded stigmas and gynophore hairs. The numerous white, fluffy gynophore hairs attached to the "seeds" (fruits) act as wind sails, carrying the seeds away on the slightest breeze (cattails have aptly been called "the dandelions of the swamps"). The fruits of *Typha* are folicles (one-carpellate, splitting lengthwise along the abaxial suture), but are widely called achenes or, more popularly (as done here) seeds. They are minute (1-1.5 mm long, 0.02 - 0.03 mg), brown, and spindle shaped, and long-lived, which is consistent with the fact that a mature female spike disintegrates slowly, and may not release all of its seeds for more than a year. While seed production is prodigious, most reproduction in *Typha* is by rhizome spread.



Classification and Geography

Typha is a genus of about a dozen (estimates vary from 8 to 20) species, widely distributed in temperate and tropical regions of all continents except Antarctica. The genus is placed in its own family in essentially all older literature, but it is very similar to *Sparganium* (burreed). A strong case has recently been made for adding the latter to the Typhaceae, and recent authors often put both genera in the family. The two most abundant species of *Typha* are *T. latifolia* and *T. angustifolia*, and these as well as their hybrid occur in Canada. *Typha domingensis* Pers. (southern cattail, Dominican cattail), which is often confused with the similar *T. angustifolia*, occurs in the US but not near Canada. Of the Canadian taxa, *T. latifolia* is easiest to distinguish. It has flat, light-green, broad leaves [(5)8-15(30) mm wide] that rarely overtop the flowering spike, and the male and female portions of the flowering spike are usually contiguous or



only slightly separated. *Typha angustifolia* is a less robust, but often taller plant than *T. latifolia* (although both species can exceed 2.5 m), and the leaves typically extend noticeably beyond the spike. It has dark green, narrower leaves [3-8(15) mm wide] and the male and female parts of the flowering spike are well separated. The female fruiting head of *T. latifolia* is wider than that of *T. angustifolia*, and also tends to be wider near the top than near the bottom. The robust *T. xglauca* is substantially sterile, propagating mostly by rhizomes and clone fragmentation. It should be understood that the concept "*T. xglauca*" does not simply designate first generation (F₁) hybrids (which appear to constitute most plants assigned to the taxon), but also similar plants produced by selfing (i.e. F₂ and subsequent generations) or by backcrossing to the parents (i.e. introgressants). A range of plants tending toward one or other of the parental species often makes identification difficult, and microscopic characters are required (see key, below; in theory, some plants will be exactly intermediate between the hybrid and one of the parents, making assignment impossible or arbitrary). In a recent study species-specific molecular markers were used to improve the use of morphologi-

ical characters in identification of North American *Typha* species. The leaves of *T. xglauca* are usually described as glaucous (blue-green), but this is not a particularly useful character for identification. A waxy bloom (responsible for glaucousness) has also been noted in many plants of *T. latifolia*, and sometimes in *T. angustifolia*. The morphology of *T. xglauca* is generally intermediate between that of *T. latifolia* and *T. angustifolia*, although hybrid vigour is often evident, the plants sometimes reaching 3 m in height.

Key to Canadian *Typha*

1a. Staminate (upper) portion of spike usually contiguous with the female (lower) portion; pistillate bracteoles¹ absent; stigmas lanceolate to lance-ovate; gynophore hairs linear and colourless; pollen mostly tetrads *T. latifolia*

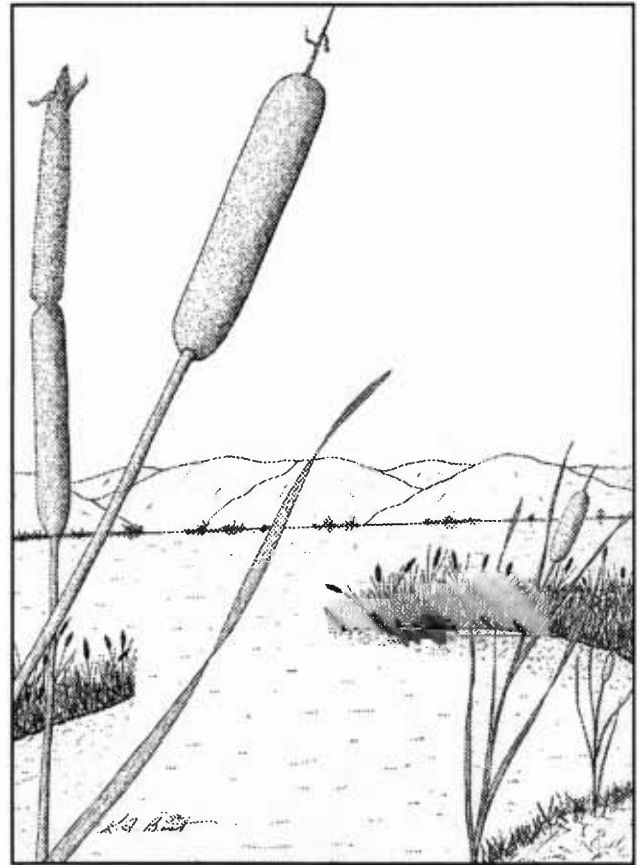
1b. Staminate portion of spike usually separated by a gap from the female portion; pistillate bracteoles¹ present; stigmas linear to linear-lanceolate; gynophore hairs enlarged and brownish at the tips or barely enlarged and more or less colourless; pollen comprised of monads, or a combination of monads, dyads, triads, and tetrads **2**

2a. Pistillate bracteoles¹ broader than the linear stigmas; gynophore hairs enlarged and brownish at the tips; spikes brown at anthesis; pollen in monads *T. angustifolia*

2b. Pistillate bracteoles¹ narrower than the linear-lanceolate stigmas; gynophore hairs barely enlarged and more or less colourless at the tips; spikes green at anthesis; pollen a mixture of monads, dyads, triads, and tetrads *T. xglauca*

¹ A cluster of female flowers should be removed from the spike and observed with at least 20x magnification. Higher magnifications are required for pollen. Dried material is preferably restored to natural size and shape before viewing by using a wetting solution, such as soapy water. Do not mistake the terminally expanded pistillodia of sterile female flowers, which are common, for bracteoles (see figures).

Typha latifolia occurs in all provinces and territories of Canada, extending into central Alaska, south to Florida, Texas, California, Mexico and Guatemala. It also occurs in Eurasia, East Africa, India and (by introduction) Australia. *Typha angustifolia* is more narrowly distributed, occurring from southeastern Canada to southern Saskatchewan. It extends along the Atlantic coast to South Carolina and Florida, in the Midwest and north-central Great Plains to Oregon and California, and also occurs in Europe. Studies have shown that there is latitudinal and altitudinal ecotypic variation in both *T. latifolia* and *T. angustifolia*, and a number of infraspecific taxa (generally of doubtful signifi-



cance) have been recognized. Some authors have suggested that *T. angustifolia* is not native to North America, but is an alien, introduced with early European settlement, subsequently migrating westward; others have suggested that *T. angustifolia* of North America and of Europe are different species. *Typha xglauca* is generally found where the two species occur together, but is also known from a few localities north of the northern range limit of *T. angustifolia*, such as Anticosti Island, central Manitoba, and southwestern Saskatchewan. It is often in disturbed areas such as roadside ditches. Apparently during the last century *T. angustifolia* spread strongly inland and westward across southern Canada and the northern US, and hybrids became more common in these regions.

Ecology

Cattails have been described as semiaquatic, palustrine, and emergent, all of which indicate that they grow with their base in standing water. The seeds germinate readily on mud, but also completely underwater; seeds of *T. angustifolia* have been found to germinate best in 2.5 cm of water, but can germinate in water as deep as 40 cm. Submersed cattail seedlings have flaccid leaves, the upper portions of which may float. The pointed seeds of *T. latifolia* can become embedded in the skin of fishes, and accordingly transported. The plants are normally rooted in soil, although both species can form floating mats. The aerenchyma in the leaves is continuous with aerenchyma in the rhizomes, pro-

viding aeration to the underwater portions of the plant, especially the roots. A greater ventilation capacity (estimated as about twice as high) has been suggested as the reason that *T. angustifolia* can grow in deeper water than *T. latifolia* (the former may tolerate a depth of up to 1.5 m, the latter up to 1 m), and is competitively superior in deeper water, but often outcompeted in shallower water. One report found that when the two species compete, *T. latifolia* is superior to a depth of 25 cm, while another found superiority to a depth of about 40 cm. Cutting the plants below the water line is believed to be effective in controlling them because it prevents the rhizomes and roots from receiving oxygen. The air channels of the plant are not only important for providing oxygen to the roots, but also for increasing photosynthesis. One study showed that CO₂ produced in underwater parts and perhaps also by microorganisms is transported through the aerenchyma to the leaves, greatly increasing CO₂ availability to the chloroplasts; this strong stimulus to photosynthesis perhaps explains the exceptionally high productivity of cattails compared to other plants that employ conventional C3 photosynthesis.

Typha latifolia occurs from tropical to northern areas, and from sea level to over 2,000 m. *Typha angustifolia* and *T. xglauca* are found in a narrower range of climate and habitats; although often sympatric with *T. latifolia*, both (at least in North America) occur principally in early to mid-successional communities, and are frequently found in disturbed wetland sites. *Typha latifolia* grows in almost any substrate that remains wet or saturated most of the growing season, and tolerates some salinity and acidity (it has been said to be the only species of *Typha* in acidic areas). It is common in marshes, fens, wet meadows and roadside ditches, and along lakeshores, seacoast estuaries and pond margins. *Typha angustifolia* occurs in similar soils but can tolerate more saline and/or alkaline substrates, and frequently inhabits brackish marshes. *Typha xglauca* has been said to be intermediate in its ecology, but competitively superior to its parents under unstable water conditions.

Cattails are ecologically useful, the rhizomes and roots playing a major role in stabilization of shorelines and river banks. Nevertheless, they can be extremely serious weeds of irrigated agricultural lands and managed aquatic systems, and while this review emphasizes the benefits of cattails it should be noted that there are very extensive efforts to control *Typha* under certain circumstances. Cattails are often considered undesirable by wildlife managers because of their ability to take over marshes and other freshwater environments, excluding other plants, reducing wetland diversity and providing habitat and food for a relatively narrow range of animals. Although some geese are attracted to cattails, ducks are not, so that generally aquatic gamebird managers want cattail populations reduced to allow growth of a variety of other aquatic plants. Cattails tend to block or silt up irrigation and drainage canals, and obstruct commercial and recreational activities in lakes, ponds and marshes. Cattails also increase water loss in fields and reservoirs. Red-winged blackbirds, which are frequently found near cattails and nest in

cattail stands, are often considered to be very damaging pests to nearby sunflower fields in the US. A North Dakota analysis of the *benefits* of controlling cattails with herbicides to reduce blackbird depredation of sunflower and the *costs* of reducing waterfowl and upland game suggested that an appropriate trade-off was to achieve a 70:30 ratio of open water and cattails.

Use as Food

All parts of the plant are utilizable as food, and have been eaten widely by indigenous inhabitants of countries wherever *Typha* species are found. The rhizomes can be consumed as a cooked vegetable, or dried and ground into flour. The pollen also provides a protein-rich flour. Young shoots are eaten raw or cooked like asparagus. The young inflorescences resemble corn on the cob, and can be eaten raw, boiled, steamed, or made into soup. Young stem sections can be pickled. The seeds are also edible, and have an attractive nutlike flavour. *Typha latifolia* was exceptionally important to indigenous North American Indians, and indeed some authors have contended that it was their most important food plant. Early European settlers sometimes survived on it in times of need. Indeed, *Typha* species worldwide have been eaten during famines, and it has been said that no one should starve or even go hungry in an area where cattails are abundant. Broad-leaved cattail attracted extensive use because of its widespread occurrence and the availability of edible components throughout much of the year. The tubers were used as a starch food staple throughout the late summer, autumn and winter (although more palatable in the early summer, starch content is highest in the fall). American Indians spread ripe, opened cattail heads on flat stone, ignited the floss, and swept up and ate the parched seeds that remained. Numerous recipes for consuming the various organs of cattails are available on the Web, and in 'Wild Green Vegetables of Canada' by A.F. Szczawinski and N.J. Turner.

Chemistry

Fresh rhizomes contain about 75% water. About 80% of the dried rhizome is carbohydrate, including 30-40% starch and about 25% sugars. About 8% of the dried root is protein. The content of calcium, iron and potassium, nutrients important to human health, has been evaluated as far superior to that of potato or rice. The pollen contains about 15-20% of each of starch and protein. About 20% of the seeds is made up of an edible oil, of which about 70% is linolenic acid. One of the weapons in the considerable competitive arsenal of cattails is allelopathy. The roots release compounds that are toxic to nearby competing species, and this seems to be an important mechanism by which cattails displace other aquatics. There is a fairly large literature describing the allelopathic chemicals. The above-ground portion, like the rhizomes, produces a very high amount of biomass. The leaves contain 30-35% cellulose, and 19 to 37% hemicellulose. Lignin content is between 10 and 15%.

Toxicity

There are isolated reports (more than half a century old) of alleged poisoning of horses, cattle, and humans as a result of consumption of *Typha*. However, rather deadly emergent aquatic plants sometimes grow with cattails (especially species of *Cicuta*, water hemlock; *Iris* species can also be poisonous, and when vegetative could easily be mistaken for *Typha*); perhaps these have been the basis of some poisoning reports. *Typha* species have long been considered edible, and significant concentrations of poisonous constituents do not seem to be present. Livestock have been fed cattails, without apparent problems (although the foliage is much less palatable and nutritious than the rhizomes). Of course, should the water in which cattails grow be polluted by sewage or poisoned by heavy metals or other industrial contaminants, the resulting herbage could be toxic. Cattails can absorb substantial amounts of heavy metals, and have been used to help purify metal-contaminated water. Wild food gatherers should also be aware that roadside collection of plants can be hazardous because of toxins, and roadside ditches in which cattails grow are especially susceptible to contamination. As in many plants of the Araceae, calcium oxalate crystals are common in cattails. These may irritate the mouths of some people, so eating cattail parts raw is not advisable.

As noted below, cattail pollen is employed in herbal medicine. It has been recommended that the pollen should not be prescribed for pregnant women (it is an emmenagogue, i.e. a promoter of regular menstruation). Although to be avoided during pregnancy, the pollen is used by wild food enthusiasts as a protein-rich additive for bread, pastries and porridge. The pollen is allergenic to susceptible individuals, but this is uncommon. Experimental feeding of *Typha latifolia* pollen to honeybees showed that while the bees could digest the pollen, they only survived for 21 days on average, compared to 57 days for bees fed on a mixture of typical bee-preferred pollens. It was concluded that cattail pollen is detrimental for honeybees, and perhaps toxic for them. It has been suggested that the high starch content (which bees digest poorly) is the reason cattail pollen is bad for bees. Honeybees can eat most pollens but not those of cattails, while cattail pollen is perhaps the only pollen used directly by humans as food.

Non-Food Uses

Cattail marshes were so important to North American Indians that tribal wars took place over their control. Some societies made multiple use of cattail plants and developed a very high level of dependence on them. Examples include inhabitants of Lake Titicaca in the South American Andes, and Lago de Amatitlán (Guatemala). Cattails are still widely used in some countries for roofing, bedding, basketry, shoemaking, ropes, and paper, but mostly for handicrafts manufactured as cottage industries. Although quite combustible, cattails were used by pioneers for bedding and insulating houses. The fluff from fruiting spikes has been used for stuffing mattresses, quilts, pillows, life-preservers, stuffed toys, and diapers. Among the more important

recent uses are alcohol manufacture and decontamination of polluted water. Although the plants can be very invasive, they are cultivated as ornamentals on the borders of ponds or small pools.

Cattails have been used in folk medicine to treat a wide variety of illnesses. North American native peoples widely used pollen as a hemostat and astringent, to control bleeding. The pollen is still so used in Chinese medicine, and preparations are also marketed to treat coronary heart disease, to lower blood lipid level, and for other purposes. However, cattails are not employed in modern western medicine.

Cattail stands provide critical food and habitats for wildlife. Cattails are good cover and nesting areas for wildfowl, although the tiny, very hairy seeds are eaten by only a few kinds of waterbirds. The rhizomes, leaves and stems are heavily consumed by muskrats, which also use the foliage to construct their lodges. Abandoned lodges are also used as nesting and staging platforms by marsh birds.

Agricultural and Commercial Aspects

There are at least a dozen species of *Typha* worldwide, all of which have been harvested historically and have provided important staples for local inhabitants. Collection of wild plants remains important for various cottage industries. There has been occasional large-scale (commercial) harvesting of natural stands, and even experimental cultivation as a crop, but developing cattails as a new crop is in its infancy.

Cultivars & Germplasm

Typha species are wild plants that have not been examined from the point of view of germplasm evaluation. It has been shown that there is extraordinarily extensive genetic variation available in *T. latifolia* and *T. angustifolia*. Some ornamental forms, notably variegated-leaved *T. latifolia*, are available, but are not of interest as crops. Cattails are generally aggressive inhabitants of widespread aquatic habitats, so that there appears to be limited danger of natural gene pools being eliminated, although some genetically distinct peripheral populations may be subject to threat. Increasing possibilities of hybridization due to the westward spread of *T. angustifolia* may also threaten some gene pools of *T. latifolia*.

Prospects

Cattails are widely regarded as an enormous potential resource for food, energy, and industrial products. A cattail stand is a natural extensive monoculture, comparable to a forest, but unlike a forest the kind of technology needed for harvesting has not yet received much development. Because they grow in wetlands, cattails do not compete for land used for crops or forests, which is in very short supply. Unlike conventional crops, cattails can be raised without pesticides, herbicides, or fertilizers. A very large and untapped land base is present in all areas of Canada that could be used for the managed cultivation of cattails. It has been estimated that over 5,000,000 km² of Canada could be used to

harvest wetland energy crops, while only 1,200,000 km² has been defined as agricultural land (60% of this suitable for field crops, 40% usable only for pasture). Cattails have often been proposed as biomass crops for renewable energy, and as sources of industrial chemicals. Over 40% of the total biomass of cattails can be converted to fermentable material, so that ethanol production is quite feasible (estimated yields are 1,500 - 6,000 l/ha). Also, pelletized fuel from cattail for home heating and grain-drying is thought to be feasible. The annual productivity for *T. latifolia* has been found to range from 6 to 20 tonnes/ha. A biomass of 34 tonnes/ha has been recorded for *T. xglauca* in Wisconsin. Under managed conditions, it has been estimated that cattail's productivity can exceed 40 tonnes/ha of dry matter. By comparison, wheat produces 1.3 - 7.0 t/ha, Jerusalem artichoke 17t/ha, sugarbeet 30 t/ha, and corn 7 t/ha. Cattail rhizomes are frequently less than 30 cm below the soil, so that the technology for harvesting is not demanding. There have been several North American economic analyses of the potential profitability of harvesting natural stands of cattails for biomass purposes (e.g. for alcohol production), and the predictions have been rather uncertain. However, with energy prices having risen very rapidly, the concept of using this renewable resource is increasingly promising.

The potential food use has particularly intrigued many specialists interested in developing new agricultural crops. An edible oil has been extracted from the seeds, and cattail oil has been compared to linseed oil, but the small size of the seeds suggests that *Typha* would be difficult to develop as a seed crop. The rhizomes are edible, but not particularly palatable, and the food potential lies in extracting edible components industrially, or perhaps feeding the rhizomes to livestock. Experiments at the Cattail Research Centre of Syracuse University showed fresh rhizome harvests of 34,000 kg/ha for *T. latifolia*, and 326,000 kg/ha for *T. xglauca*. (Dry weight was about 25% of fresh rhizome weight.) The dried rhizomes yielded about 55% flour, with a starch content of about 50% (this is higher than usually reported; starch yields of 30 to 40% are more typical). The protein content (6-8%) of cattail flour is comparable to wheat, corn and rice. The carbohydrate content of cattail flour (about 80%) is higher than that of potato. Some authorities have suggested that yields of over 7 tonnes/ha of flour are possible for *T. latifolia*, which compares very favourably with wheat. Based on the above experimental yields, perhaps 10 times this figure are possible with *T. xglauca*! *Typha* is an undomesticated plant, and its yield potential could be quite phenomenal if subjected to selection. Cattails offer incredible economic rewards, but do require the kind of long-term investment in research and development that is increasingly difficult to obtain.

Cattails are among the most dominant and common plants of marsh habitats, and in discussing their economic potential it should be remembered that aquatic habitats are fragile, and any programs of development undertaken in existing wetlands should have as their goal the creation of sustainable, ecological-

ly-friendly systems. One interesting proposal is to harvesting cattails in strips; this is compatible with preservation of wildlife and makes replanting unnecessary. The creation of new wetlands for cattail cultivation could have great benefits for wildlife and biodiversity.

Myths, Legends, Tales, Folklore, and Interesting Facts

-Of all flowering plants, *Typha* has been said to have the greatest number of flowers per unit volume of inflorescence. A single cattail of *T. latifolia* can produce over 200,000 seeds, while one of *T. domingensis* can produce 700,000.

-A single common cattail spike can produce 400 million pollen grains.

-The buoyancy of cattails has been exploited for various purposes. Some inhabitants of Lake Titicaca (at the Peru-Bolivia boundary) live on huge rafts constructed of layers of cattail stems. The ancient Aztecs created stationary islands in marshes, made of cattails. Unsinkable boats made of cattails were commonly constructed by natives in southern Asia and in the Americas. Cattail stems simply tied in bundles have served as floats to aid swimmers in India. Native North Americans ingeniously wove floating duck decoys out of cattails. Cattail floss is particularly buoyant, and during World War II, several million pounds were used as a substitute for kapok in life jackets.

-Some palindromes (words, verses or sentences that read the same backwards as forwards):

Well, I attack, cut, 'n' tuck cattail, Lew.

Well, I attack cats 'n' stack cattail, Lew.

-Terminology for belowground structures of plants is frequently misapplied. A *rhizome* (also called a *rootstock*) is an underground stem. Perennial creeping monocots (such as cattail, many grasses and sedges) and non-flowering higher plants (such as ferns and horsetails) often spread by rhizomes. Rhizomes typically produce roots and shoots at their nodes and tips. By contrast, *stolons* are creeping *aboveground* horizontal stems. Numerous plants proliferate laterally neither by rhizomes nor stolons, but simply by spreading roots, which produce buds that grow into new stems. Unlike rhizomes and stolons, roots do not have nodes and internodes.

-The nomenclatural conventions governing hybrids are rather complex. Species of hybrid origin can be designated two ways using the mathematical multiplication symbol x (not in italics): 1) by "hybrid formula," listing the species alphabetically (*Typha angustifolia* x *T. latifolia*), or 2) by preceding the epithet with the x (*T. xglauca*; note that a space is often inserted between the x and the epithet: *T. x glauca*; however, it is recommended that a space not be inserted, unless the symbol x is unavailable, and a lowercase x must be substituted). Alternatively, hybrids can be designated by the prefix notho- or n- (Greek for hybrid): *Typha nothospecies glauca*.

-Cattail floss is irritating to eyes. American Indians are said to have blown it into the eyes of their enemies during battle to temporarily blind them. Nevertheless, adolescents commonly engage in duels with cattail stems, showering each other with clouds of soft fluffy down.

-True to its name, *Typha elephantina* Roxb. (elephant grass) can be huge (to 4 m), and is enthusiastically grazed by elephants in India.

-Natives in Australia used cattail stems as spear handles.

-American Indians relied on layers of woven cattail leaves to weatherproof their wigwams and lodges. The leaves swell when wet, so that they are excellent for closing up windy holes and cracks.

-Cattails and fire seem to be companions. The pollen of *Typha* is highly inflammable (like the spores of clubmoss), and has been used to manufacture fireworks. The female flowers make an excellent tinder, and can be lit by the spark of a flint. Cattail heads are often soaked in kerosene, lighted and carried as torches.

-The long-billed marsh wren (*Cistothorus palustris*) is almost exclusively a denizen of cattail marshes. It almost always uses cattail leaves to build sack-shaped nests (characterized by a small circular opening in one side), which are suspended from cattail plants.

-In many old paintings Jesus is depicted at his trials holding a cattail as a mock sceptre (e.g. Van Dyck's 'Jesus Crowned with Thorns').

-The Old Testament's "reeds" of Exodus 2:3 and "rushes" of Isaiah 19:6 were probably cattails.

-Cattail heads are often gathered for decorative purposes. As noted earlier, mature cattail heads are designed to explode as they dry out in order to disperse the seeds, and it can be disconcerting if they dry out in the heat of a house and explode without warning in a fresh cut flower display, scattering fluff everywhere. Pick immature specimens early in the season, while male flowers are in bloom, to avoid this problem. A thick coat of lacquer on air-dried collections will keep the heads intact for use in dried arrangements.

-Euell Gibbons, author of *Stalking the Wild Asparagus*, called cattails "the supermarket of the swamps" because they provide so many kinds of food.

Acknowledgments: W.J. Cody (review), B. Brookes, M. Jomphe (artwork).

This project is working to produce the flora of the vascular plants of the Canadian Arctic Archipelago in the DELTA electronic database format that will allow illustrated, interactive identification of the approximately 400 taxa of flowering plants on the Arctic Islands. Floristic data are being gathered by Susan Aiken (editor) and many contributors. Design of database structures and procedures, and maintenance of the databases on the Web, are being done by M.J. Dallwitz. The Poaceae treatment was first released in 1995, that of the Saxifragaceae in 1997, the Salicaceae, Cyperaceae, and Fabaceae in 1999, and the Juncaceae, Liliaceae, Ranunculaceae in 2000. Treatments for the Brassicaceae, Pteridophytes, and smaller families such as Betulaceae, Campanulaceae, Gentianaceae, Papaveraceae, Plantaginaceae, and Primulaceae, are developing.

The information recorded includes place of valid publication, synonymy (usually limited to names that have been associated with the Canadian Arctic), common names, vegetative and floral morphological characters (many more than present floras of the area), distribution (sometimes including information about the northernmost record of the taxon), and habitat. There are notes on ecology, indigenous knowledge, and economic uses, and other miscellaneous information. The database is illustrated with maps for each taxon, colour photographs and line drawings of characters useful for identification, and colour photographs and line drawings of the taxa and their habitats.

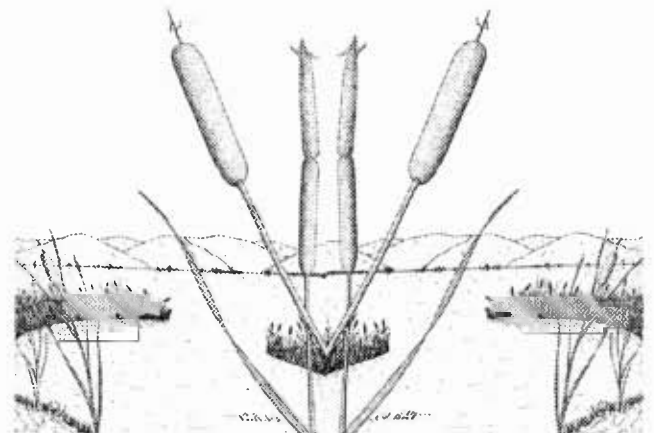
The geographical scope of this study includes all of the Nunavut, the islands of the Northwest Territories, and the islands of Nunavut, north of 55°N in northern Hudson Bay (including Southampton Island, White and Caribou Islands, Coats Island, Bencas Island, Digges and Mansel Islands) and Akpotok Island in Ungava Bay.

For more information, visit the Arctic Flora website at Website :

<http://www.mun.ca/biology>

and then select Floras and Arctic Flora.

Susan G. Aiken, saiken@mus-nature.ca



Symmetry in Plants

Roger V. Jean et Denis Barabé (éditeurs)

World Scientific, 1998

Series in Mathematical Biology and
Medecine Vol. 4

*English translation of this review will be
presented in the next issue of the CBA Bulletin*

Ce gros ouvrage de 835 pages est dédié aux frères Bravais. Ceci veut dire qu'il traite de phyllotaxie bien sûr, et non seulement en elle-même mais aussi dans ses relations avec l'ensemble des formes, animées ou inanimées, qui présentent une structure en réseau, notamment les cristaux. Que la phyllotaxie soit ainsi placée dans le cadre plus large des relations spatiales entre objets de même nature justifie alors le titre du livre « Symmetry in Plants », plus général que « Phyllotaxis » qui viendrait spontanément à l'esprit.

Ce livre est divisé en 3 parties de 10 articles chaque et de longueurs sensiblement égales : I - Données, expérimentation et description des types phyllotaxiques. II - Modélisation des phyllotaxies. III - Origine des phyllotaxies. Ces 3 parties sont précédées de 4 prologues écrits respectivement par un mathématicien (I. Adler), un botaniste (R. O. Erickson), un généticien moléculaire (A. Lima-De-Faria) et un cristallographe (A. L. Mackay), ce qui montre bien le souci (revendiqué) des éditeurs de se situer dans la lignée des frères Bravais.

I - « Basic Information Gathering and Pattern Recognition in Phyllotaxis » - Data- Experimentation-Description

Dans cette première partie (247 p.) les schémas phyllotaxiques d'un grand nombre de taxons sont examinés, dans le but de fournir des données nouvelles ou un éclairage nouveau (par exemple chez les *Vitaceae*, *Eucalyptus*, *Pinus*, *Rhododendron*, *Dipsacus sylvestris*, *Helianthus annuus*, *Ulmus glabra*, ...), l'examen portant non seulement sur la détermination des paramètres phyllotaxiques mais aussi sur l'examen des transitions entre schémas phyllotaxiques et sur les liens entre la phyllotaxie et la production de feuilles, la symétrie foliaire (symétrie pendulaire), la structure de la tige (normale ou anormale). Bien entendu les inflorescences ne sont pas oubliées. Une analyse quantitative des paramètres phyllotaxiques est développée.

Une masse importante de données est ainsi présentée au lecteur couvrant un large éventail de dispositions possibles.

II - « Pattern generation in Phyllotaxis » - Modelling

Cette partie (290 p.) est le pivot de l'ouvrage puisqu'on y trouve l'ensemble des modèles développés depuis les frères Bravais pour décrire et reproduire les diverses phyllotaxies

recensées dans la première partie. Du crocographe, machine à roues et poulies, aux plus ésotériques formalismes mathématiques, tous les moyens disponibles permettant de retracer plus ou moins fidèlement les phyllotaxies réelles sont mis à contribution. Ces modèles peuvent être grossièrement classés en 2 groupes : modèles géométriques recensant les positions relatives possibles d'éléments semblables représentés par des cercles et modèles dynamiques prenant en compte la façon dont les éléments sont engendrés au niveau de l'apex.

Le niveau mathématique de certains articles les rend parfois difficilement accessibles aux non spécialistes mais il faut souligner le réel souci pédagogique avec lequel ils sont rédigés, en particulier celui d'Adler, et ce n'est probablement pas un hasard si cet article est placé en tête de cette partie. Quoiqu'il en soit, le lecteur trouvera ample matière à enrichissement personnel dans cette seconde partie.

III - « Origins of Phyllotaxis » - Homology-Comparative Morphology-Exotic Phyllotaxis

La dernière partie de l'ouvrage (270 p.) aborde l'aspect plus causal et philosophique de la phyllotaxie. Le passage de la seconde partie à la troisième est le même qu'entre la première et la seconde : généralisation et abstraction, de sorte que la phyllotaxie soit replacée, comme annoncé en introduction, dans l'ensemble des phénomènes physiques présentant des régularités périodiques. Sont ainsi examinées, par exemple, les conditions générales de formation d'une phyllotaxie, les contraintes physiques du fonctionnement apical auto-organisé, l'universalité de la phyllotaxie, l'origine d'une périodicité structurale depuis l'atome jusqu'à l'organisme. L'évolution des végétaux terrestres est également abordée sous l'angle de l'origine et du développement de la symétrie, de la ramification et de la phyllotaxie.

Il me semble que cette partie constitue l'apport le plus original de l'ouvrage par la grande ouverture à tous les champs de la réflexion scientifique.

Un dernier point mérite d'être signalé : par le nombre et la qualité des collaborateurs de l'ouvrage, la bibliographie citée dans les divers articles peut-être considérée comme complète sur ce sujet qui est au centre des études de morphologie végétale. Ce livre est donc fondamental pour les botanistes. Il est certainement destiné à devenir un « usuel » des bibliothèques universitaires et de recherches. C'est une somme, une référence faisant le point de la question aujourd'hui. Pour comprendre certains articles, une bonne culture mathématique est toutefois requise.

Bernard Jeune, Université Pierre et Marie Curie, Paris

President / président :

Joe Gerrath, Dept. of Botany, University of Guelph, Guelph, ON, N1G 2W1.
Tel. : (519) 824-4120; fax : (519) 767-1991; e-mail : jfgerratt@uoguelph.ca

Past-President / président sortant :

Denis Barabé, IRBV-Jardin botanique de Montréal, 4101 rue Sherbrooke Est, Montréal, QC, H1X 2B2.
Tel. : (514) 872-1436; fax : (514) 872-3765; e-mail : denis.barabe@umontreal.ca

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Liette Vasseur, Dept. of Biology, Saint Mary's University, Halifax, NS, B3H 3C3.
Tel. : (902) 496-8234; fax : (902) 420-5261; e-mail : liette.vasseur@stmarys.ca

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Melanie Jones, Okanagan University College, 3333 College Way, Kelowna, BC, V1V 1V7.
Tel. : (250) 862-5464 ext. 7553; fax : (250) 470-6005; e-mail : mjones@okanagan.bc.ca

Secretary / secrétaire :

Christine Maxwell, Biology Department, Trent University, Peterborough, ON, K9J 7B8.
Tel. : (705) 748-1357; fax : (705) 748-1205; e-mail : cmaxwell@trentu.ca

Treasurer / trésorière :

Geraldine A. Allen, Dept. of Biology, University of Victoria, Victoria, BC, V8W 2Y2.
Tel. : (250) 721-7110; fax : (250) 721-7120; e-mail : allenr@uvvm.uvic.ca

Directors / directeurs (1999-2001)

Sylvie Laliberté, Dép. des sciences biologiques, Université du Québec à Montréal,
C.P. 8888, Succ. Centre-ville, Montréal, QC, H3C 3P8.
Tel. : (514) 987-3963; fax : (514) 987-4647; e-mail : laliberte.sylvie@uqam.ca

Ed Reekie, Biology Department, Acadia University, Wolfville, NS, B0P 1X0
Tel. : (902) 585-1162; fax : (902) 542-3466; e-mail : ereekie@ace.acadiau.ca

Ed Yeung, Dept. of Biological Sciences, University of Calgary, Calgary, AB, T2N 1N4
Tel. : (403) 220-7186; fax : (403) 289-9311; e-mail : yeung@acs.ucalgary.ca

Directors / directeurs (2000-2002)

Paul Cavers, Dept. of Plant Science, University of Western Ontario, London, ON, N6A5B7.
Tel. : (519) 679-2111; fax : (250) 661-3935; e-mail : pcavers@julian.uwo.ca

Michel Labrecque, IRBV-Jardin botanique de Montréal, 4101 rue Sherbrooke Est, Montréal, QC, H1X 2B2.
Tel. : (514) 872-1862; fax : (514) 872-3765; e-mail : michel_labrecque@ville.montreal.qc.ca

Shannon M. Berch, BC Ministry of Forests Glyn Road Research station,
P.O.Box 9536, Stn Prov.Govt., Victoria, BC, V8W 9C4.
Tel. : (250) 952-4122; fax : (250) 952-4119; shannon.berch@gems7.gov.bc.ca

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